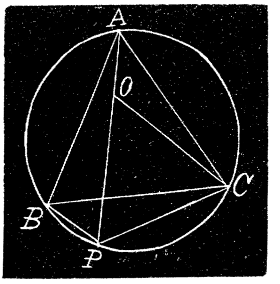


$$AC^2 = CP^2 + AP^2 - 2CP \times AP\cos 60^\circ$$
$$= CP^2 + AP^2 - CP \times AP.$$

$\therefore AB^2 + AC^2 = BP^2 + AP^2 + CP^2 + AP^2 - [BP \times AP + CP \times AP]$.

But $AP = BP + PC$, American Mathematical Monthly, Vol. I., No. 9, p. 315, Prob. 19.

$AP^2 = BP \times AP + PC \times AP$, by multiplying both sides of the above equation by AP.

$\therefore AP^2 - [BP \times AP + PC \times AP] = 0$.

$\therefore AB^2 + AC^2 = BP^2 + AP^2 + CP^2$, and

$BP^2 + AP^2 + CP^2$ is constant. Q. E. D.

Excellent solutions of this Problem were received from *P. S. BERG, G. B. M. ZERR, O. W. ANTHONY, COOPER D. SCHMITT, J. F. W. SCHEFFER, JOHN B. FAUGHT, G. I. HOPKINS*, and *E. W. MORRELL*. Two solutions were received without the names of the authors signed to them.

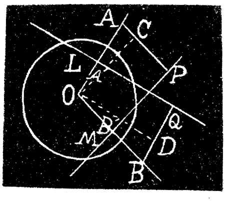
46. Proposed by J. C. GREGG, Superintendent of Schools, Brazil, Indiana.

Given two points A and B and a circle whose center is O: show that the rectangle contained by OA and the perpendicular from B on the polar of A, is equal to the rectangle contained by OB and the perpendicular from A on the polar B.

Solution by JOHN B. FAUGHT, A. B., Instructor in Mathematics, Indiana University, Bloomington, Indiana; P. S. BERG, Larimore. North Dakota; and J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

Let L be the polar of A, and M the polar of B. Let AP be a perpendicular on M, and BA a perpendicular on L.

Draw OC parallel to M, and OD parallel to L. Then $OA.OA' = OB.OB' = R^2$, by definition.



$$\therefore \frac{OA}{OB} = \frac{OB'}{OA'} = \frac{CP}{BA}.$$

The triangles OAC and OBD are similar.

$$\therefore \frac{OA}{OB} = \frac{AC}{BD} = \frac{CP}{DA} = \frac{AC + CP}{BD + DA} = \frac{AP}{DA}.$$

$\therefore OA.BA = OB.AP$. Q. E. D.

Excellent analytical solutions of this problem were received from *G. B. M. ZERR, COOPER D. SCHMITT*, and *E. W. MORRELL*. Prof. Morrell sent in two solutions.

A solution was also received without the author's name signed to it.

PROBLEMS.

52. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

If the *center* of a rolling ellipse *move in a horizontal line*, determine the surface on which the ellipse rolls.